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# Factors Influencing the Provision of Classroom-based Physical Activity to Students in the Early Years of Primary School: A Survey of Educators

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## Abstract

Evidence suggests that multiple factors affect implementation of school-based physical activity interventions. This survey study examined the factors that influence the provision of classroom-based physical activity to students in the early years of primary school in Australia. A social ecological approach guided questionnaire design and analysis. A 45-item online questionnaire was administered to Australian classroom teachers and assistant, deputy and school principals working with students in Prep/Kindergarten to Year 2. Descriptive analysis determined response frequencies and content analysis was used to identify common themes in open-ended responses. The survey response rate was 22%; 34 of the 75 participants answered at least 93% of the survey questions. Barriers to providing classroom-based physical activity include: insufficient time, limited training opportunities, limited resources, educator attitudes to physical activity, and confidence. Proposed strategies to overcome barriers include the provision of training and resources to improve educator knowledge of the benefits of classroom-based physical activity for children's health and learning, and to improve their confidence in delivering classroom-based physical activity. Creating a supportive school culture towards physical activity through implementation of whole-of-school physical activity policies is recommended. Overall, the results of this study suggest that multiple strategies, targeted at the individual (i.e., educator) and organisational (i.e., school) levels, may be necessary to enable Australian schools to overcome perceived barriers to providing physical activity opportunities to students in the early years of school during class time. Findings from this research elucidate how Australian schools may be best supported to implement classroom-based physical activity programs, as part of a whole-of-school approach to physical activity promotion.

**Keywords** Early childhood · Movement · Classroom teachers · Physical activity promotion · School children

## Abbreviations

CBPA	Classroom-based physical activity
CSPAP	Comprehensive school physical activity program
CT	Classroom teacher
PA	Physical activity
PD	Professional development
SP	Assistant, deputy or school principal

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## Background

The benefits of participation in regular physical activity (PA) for the physical and mental health of children and adolescents is widely reported in the literature (Poitras et al. 2016; World Health Organization 2017). However, low levels of PA continue to be reported globally (Guthold 2019). In Australia, for example, current trends suggest that children and adolescents are not achieving the recommended levels of PA required for optimal health, with figures showing a concomitant decline in Australian children's aerobic and muscular fitness (Active Healthy Kids Australia 2018; Schranz et al. 2018). In addition, low levels of mastery over movement skills (e.g., object control and locomotor skills) have been reported in girls and boys by Grade 6 (Schranz et al. 2018). Thus, identifying opportunities for children and adolescents to achieve the recommended 60 min of moderate-to-vigorous levels of PA each day is becoming increasingly important not only for their fitness and movement skill development,

but also in the prevention of chronic disease (Aubert et al. 2018).

Schools are ideally positioned to establish health-promoting environments by providing multiple opportunities for students to be active each day. This may include providing PA opportunities before school, during school class time, during recess and lunch breaks; and after school, in addition to the inclusion of a regular physical education (PE) program (Centers for Disease Control and Prevention 2013; Hills et al. 2015). This whole-of-school approach to PA promotion is known as a comprehensive school physical activity program (CSPAP) (Centers for Disease Control and Prevention 2013). The widespread implementation of CSPAPs in Australian schools is a key recommendation recently proposed to address rising concerns over the PA trends of Australian children and adolescents (Active Healthy Kids Australia 2018).

One approach for increasing students' activity levels during the school day, that may also improve educational outcomes, is scheduling active lessons and breaks during school class time, commonly known as classroom-based physical activity (CBPA) (Watson et al. 2017; Hills et al. 2015; Webster et al. 2015). CBPA differs from PE and recess or lunch breaks in that it involves integrating movement into academic lessons or scheduling movement breaks during school class time, with or without an academic focus (Webster et al. 2015; Watson et al. 2017). Preliminary findings from studies evaluating CBPA interventions are favourable, with beneficial effects reported for both PA-related outcomes (e.g., motor skills, aerobic fitness and PA levels) and educational outcomes (e.g., improved academic performance, on-task behaviour) (Watson et al. 2017; Martin and Murtagh 2017; Erwin et al. 2012). However, evaluation of the practicalities of implementing CBPA interventions in 'real-world' contexts is also essential to determine whether interventions can be successfully reproduced and sustained (Bauman and Nutbeam 2013). In fact, there is strong empirical evidence to suggest that multiple factors affect the implementation of health promotion and preventative interventions, including school-based PA interventions (Durlak and DuPre 2008; Naylor et al. 2015).

A growing number of studies have investigated the various factors that may enable or hinder classroom teachers from implementing CBPA programs during the school day (Carlson et al. 2017; Webster et al. 2017). A recently published systematic review by Michael et al (2019) synthesised the findings from 28 studies investigating facilitators and barriers to integrating movement in elementary classrooms. Findings revealed that factors influencing movement integration in elementary schools occurred primarily at the institutional (i.e., the school level) and intrapersonal (i.e., exist within the teacher) levels of a social ecological framework (Michael et al. 2019). Factors influencing the

implementation of movement opportunities at the interpersonal, community, and public policy levels have been described less often (Michael et al. 2019; Naylor et al. 2015), which may be due to the fact that perspectives from classroom teachers, and not others, have been most frequently reported in the literature.

To date, the majority of studies investigating factors influencing the implementation of CBPA interventions in the primary school setting have been conducted in North America, Europe, and the United Kingdom (see review by Michael et al. (2019)). A limited number of studies have been conducted in Australia across Prep/kindergarten to Year 6 (Usher and Anderton 2014; Mazzoli et al. 2019) and Years 3 to 5 (Watson et al. 2019; Macdonald et al. 2014). However, in Australia, curriculum pressures and demands may differ across year levels of primary school. For example, national testing of numeracy and literacy in Australian schools commences in Year 3. Given that primary schools are in a position to positively influence children's PA behaviour as they commence school and that increased curriculum pressures associated with standardised testing commence in Year 3, this study focuses on the early years of primary school in Australia (i.e., Prep/kindergarten to Year 2). Therefore, the aim of this study was to examine factors that influence the provision of CBPA to students in the early years of primary school in Australia, within a social ecological framework. Understanding the factors that may influence the implementation of CBPA in the Australian context will allow for a more targeted approach to support for schools (Naylor et al. 2015).

## Methods

### Study Design and Participants

This study employed a cross-sectional survey design, using an online questionnaire to collect data from participants using Qualtrics software (Qualtrics 2013.). Study participants included Australian primary school staff who would be involved in the development, implementation and evaluation of CBPA programs with students in the early years of primary school, if such PA programs were implemented at their school. Specifically, participants were eligible for inclusion in the study if they self-reported that they: (i) held an accredited teaching qualification; (ii) were eligible to work in Australian public, independent, and/or Catholic primary schools; and (iii) taught the Foundation to Year 2 Australian Curriculum to students; or (iv) had responsibility as a school principal, deputy, or assistant principal to supervise/oversee the delivery of the Foundation to Year 2 Australian Curriculum at their school. Ethics approval was

obtained from the Bond University Human Research Ethics Committee (Protocol number KM03093).

## Recruitment

Recruitment of participants occurred across two phases. First, a Facebook page dedicated to the research study was created as a forum through which to invite eligible participants to complete the online questionnaire. This initial phase took place between February and March, 2019. Second, following research approval from selected school jurisdictions, principals from primary schools in south east Queensland ( $n=30$ ), northern New South Wales ( $n=3$ ), and the Australian Capital Territory ( $n=3$ ) were invited via email to involve their school in the study. This second phase of recruitment occurred between June and September, 2019. The school principals were known to the research team through existing professional networks. Following gatekeeper approval, an invitation to participate in the online questionnaire was circulated by the school principal to eligible staff members from the corresponding primary school. Prior to completion of the online questionnaire, prospective participants were required to confirm that they (i) met the eligibility requirements; (ii) had read and understood the participant information sheet and consent form; and (iii) provided their consent to take part in the questionnaire. All responses were anonymous.

## Theoretical Framework Underpinning the Questionnaire

Following a review of the relevant empirical literature, a social ecological approach was chosen as the theoretical framework through which to examine the contextual factors that may influence the provision of CBPA to students in the early years of primary school (Naylor et al. 2015; Durlak and DuPre 2008; Webster et al. 2017). A social ecological framework can be used to gain a comprehensive understanding of the factors that influence behaviour at the individual, interpersonal, organisation, community and public policy levels (Bronfenbrenner 1977; McLeroy et al. 1988). As such, a social ecological model takes into consideration not only the attributes of an individual, but also the social and environmental factors that may facilitate or inhibit the behaviour of an individual (Sallis et al. 2003; Spence and Lee 2003).

## Questionnaire

The online questionnaire was comprised of four main sections encompassing 45 items, including: Sect. 1—Demographic information (7 items); Sect. 2—Current use of CBPA with students in Prep/kindergarten to Year 2 in Australian primary schools (17 items); Sect. 3—The factors

which may influence the ability and/or willingness of primary school staff to provide PA opportunities to students in the classroom (19 items); and Sect. 4—Major barriers for providing CBPA to students in Prep/kindergarten to Year 2 and suggestions for overcoming major barriers (2 items).

Section 1 of the questionnaire included information regarding the geographical location of the participants' school, the type of primary school (i.e., public, independent, Catholic), their number of years of teaching experience, whether their school had a CSPAP policy in place, and the participants' role/year level at the school.

Section 2 of the questionnaire included questions regarding whether participants had completed professional development (PD) and/or training on CBPA and whether they currently provided CBPA to students. At the beginning of this section, key definitions were provided for the terms PA, CBPA, physically active lessons and PA breaks. A clear statement outlining that CBPA is distinct from scheduled PE lessons was also provided. Participants were then asked about the frequency and methods of CBPA utilised (e.g., physically active lessons vs PA breaks). For each method, participants were asked which key learning areas of the Foundation to Year 2 curriculum they incorporated active lessons into, along with how much time they allocated (in minutes), the types of PA (e.g., gross motor skills, cardio-respiratory fitness/strengthening/flexibility activities) and the locations in which the PA occurred.

Section 3 of the questionnaire sought feedback from participants regarding 19 individual factors that may influence the ability of school staff to provide CBPA to students in Prep/kindergarten to Year 2. The factors included in Sect. 3 have been previously identified in the literature as potentially impacting the implementation process of health promotion and preventative interventions, including school-based PA interventions (Naylor et al. 2015; Durlak and DuPre 2008; Webster et al. 2017). Participants were specifically asked whether they perceived these factors as barriers, facilitators, or if they felt neutral about their influence, from the perspective of their role as a classroom teacher or principal. The 19 factors were categorised into four of the five levels within a social ecological framework; including (i) individual factors (i.e., staff beliefs and skills); (ii) interpersonal factors (i.e., relating to students and peers); (iii) organisational factors (i.e., school administration, environment, training/resources); and (v) public policy (i.e., state and national PA policies). Participants rated each factor in this section using a five-point Likert scale. Response options for each factor included 1 = strong barrier, 2 = barrier, 3 = neither, 4 = facilitator and 5 = strong facilitator.

Finally, Sect. 4 of the questionnaire included two open-ended questions, adapted from previous studies on this topic (Webster et al. 2017; Carlson et al. 2017). The purpose of the open-ended questions was to gain a deeper understanding of

the main barriers that would influence the ability and/or willingness of staff at their school to provide CBPA to students in Prep/kindergarten to Year 2, along with any suggestions for overcoming these major barriers. Common themes from responses to open-ended questions were coded and categorised using content analysis, as described further below (Elo and Kyngäs 2008).

The questionnaire was initially piloted with two primary school staff, including a specialist primary PE teacher and a classroom teacher to ensure questionnaire readability, relevance, clarity, and validity (Fink 2006). The original questionnaire included six sections and 60 items. Based on feedback received during this pilot process, the questionnaire was modified and reduced to four sections and 45 items. To minimise the time requirement of the questionnaire, two sections were removed regarding the school PE program and school recess/lunch breaks, so that the focus was on CBPA. Additionally, three items were removed regarding participants' perceptions of the proposed benefits of CBPA for the health and learning outcomes of school students and the frequency of CBPA. Finally, the Likert scale in Sect. 3 was modified from 7-points to 5-points. As proposed by Fink (2006), the responses to the pilot questionnaire were compared to the intended scope of the research questions in order to inform revisions that would maximise the external validity of the topics covered and the results generated.

## Statistical Analysis

Survey response rates were calculated based on methods recommended by the Institute for Social and Economic Research (Lynn et al. 2001) and the American Association for Public Opinion Research (The American Association for Public Opinion Research 2016) (rate definitions and formulae are provided in Online Resource 1). Survey completion rates represented the percentage of respondents who completed (i.e.,  $\geq 93\%$  of questionnaire answered) or partially completed (41–92% of questionnaire answered) the questionnaire, or where 'break-off' occurred ( $<41\%$  of questionnaire answered) in relation to the number of questions asked. For the first phase of recruitment, the number of people who received the invitation to participate in the questionnaire (eligibility unknown) was estimated using the metrics displayed on the Facebook page dedicated to the present research study. The metrics included information on how many people had been reached, along with how many times the link to the questionnaire in the Facebook post had been clicked. As it was not possible to ascertain how many of the people who received notification about the questionnaire read it or thought they may be eligible to complete the questionnaire, the number of times the link to the questionnaire in the Facebook post was clicked was therefore used in subsequent calculations to represent the

number of people who received the invitation to participate in the questionnaire (eligibility unknown) via social media. For the second phase of recruitment, the school cooperation rate, decline rate, and non-contact rate were also calculated (see Online Resource 1 for rate definitions and formulae) (The American Association for Public Opinion Research 2016). The estimated number of emails distributed to school staff inviting them to participate was calculated based on the number of Prep/kindergarten to Year 2 classroom teachers and assistant, deputy and school principals at each cooperating school.

Descriptive statistics were calculated for responses to all questions in Sects. 1 to 3, and included (i) frequencies (%) for categorical data; and (ii) means and standard deviations (SD) for interval data (IBM Corporation 2018). For Sect. 3 data, calculation of frequencies (%) was based on a simplification of the 5-point Likert scale to a 3-point scale encompassing: facilitator (combining the 'strong facilitator' and 'facilitator' options), barrier (combining the 'strong barrier' and 'barrier' options), and neither. Using an inductive content analysis process, responses to open-ended questions in Sect. 4 were organised, coded, categorised, and grouped into themes (Elo and Kyngäs 2008). Themes were subsequently categorised into corresponding levels of the social ecological framework. To assist with the content analysis process, NVivo (Version 12) software program was used (QSR International Pty Ltd 2018). A second author reviewed the responses to open-ended questions and verified major themes and categories, with any differences resolved by discussion and consensus.

## Results

### Survey Completion and Response Rates

Survey completion and response rates across the recruitment phases are summarised in Table 1. The survey response rate for the first phase of recruitment via social media, reflecting the proportion of the original 142 people who clicked on the survey Facebook post and subsequently completed or partially completed the survey, was calculated as 24%. The survey response rate for the second phase of recruitment, reflecting the proportion of the 52 invitees who completed or partially completed the survey, was calculated as 15%. The survey response rate across both phases of recruitment combined was calculated as 22%.

Review of data sets for the eight respondents who only partially completed the survey revealed that they had each only completed demographic questions and a few other questions, so their data did not usefully inform the survey. On this basis, data from those eight partial survey responses were excluded from the further analyses



**Table 1** Summary of survey completion and response rates across the recruitment phases

	Phase 1 (recruitment via social media)	Phase 2 (recruitment via schools)	Total (recruitment via phase 1 and phase 2)
Number of school principals invited (Phase 2)	N/A	n = 36	N/A
School cooperation rate	N/A	11% (n = 4)	N/A
School decline rate	N/A	3% (n = 1)	N/A
School non-contact rate	N/A	86% (n = 31)	N/A
Number of participants who received invitation	n = 142	n = 52	n = 194
Number of participants who commenced questionnaire	n = 61	n = 14	n = 75
Survey completion rate	46% (n = 28)	43% (n = 6)	45% (n = 34)
Survey partial completion rate	10% (n = 6)	14% (n = 2)	11% (n = 8)
Survey break off rate	44% (n = 27)	43% (n = 6)	44% (n = 33)
Survey response rate	24%	15%	22%

(see Online Resource 1 for rate definitions and formulae)

reported below, leaving only data from the 34 respondents who completed at least 93% of the survey questions to be analysed, and so only these data are reflected in the results reported in subsequent sections.

### Participant Demographics

The demographic characteristics of participants included in the study, for the total sample and separately for classroom teachers and school principals are summarised in Table 2. The mean number of years of teaching experience reported by the 34 included participants was  $19.41 \pm 12.06$  years (range: 2–44 years). The majority of these participants (77%: n = 26) were classroom teachers, with the remaining participants having responsibility as either a school principal, deputy, or assistant principal (23%: n = 8) to oversee the delivery of the Foundation to Year 2 Australian curriculum at their school. The majority of participants worked at schools located on the east coast of Australia, including New South Wales (29%: n = 10), Queensland (29%: n = 10) and Victoria (21%: n = 7). Participants reported they worked at primary schools primarily located within major cities (38%: n = 13) or small regional areas (35%: n = 12). The majority of participants (79%: n = 23) worked at public schools. Only 41% (n = 14) of the participants reported they currently had a CSPAP in place at their school. Just under half the participants (47%: n = 16) reported having received professional development (PD) and/or training regarding the different methods of CBPA (see Online Resource 2). Participants reported having completed a mean of  $24.75 \pm 27.27$  h (range = 3–100 h) of PD/training in this topic area.

### Current Trends in Classroom-based Physical Activity in the Early Years of Primary School

The majority of participants who listed their role as classroom teacher (88%: n = 23) and school principal (75%: n = 6) reported current delivery of CBPA to students at their school (additional data are provided in Online Resource 2). The majority of participants delivered CBPA at least three times per week, and this was consistent across all three year levels. Participants also reported using a combination of different methods of CBPA, with physically active lessons most often integrated into the key learning areas of Health and Physical Education (HPE) (which includes a theoretical component regarding health and wellbeing, and a practical component where students are provided with movement opportunities), mathematics, and English. Physically active lessons typically lasted for 30 min or less and included a combination of motor skill, aerobic, and flexibility activities and were undertaken inside the classroom or on the playground. Participants reported that PA breaks typically lasted 10 min or less, were predominantly delivered inside the classroom and also included a combination of motor skill, aerobic, and flexibility activities. Participants reported they would be likely to continue to deliver both physically active lessons and active breaks (with and without an academic focus) in the future.

### Factors Influencing the Provision of Classroom-based Physical Activity

The responses reported by participants regarding the factors (barriers/facilitators) that may influence the provision

**Table 2** Demographic characteristics of included participants, for total sample, classroom teachers and school principals

Characteristic	Total (n = 34) Frequency (%)	Classroom teachers (n = 26) Frequency (%)	School principals (n = 8) Frequency (%)
Mean (SD) years of teaching experience	19.41 (12.06)	18.65 (12.31)	21.88 (11.66)
State/Territory			
Queensland	10 (29.4)	9 (34.6)	1 (12.5)
New South Wales	10 (29.4)	7 (26.9)	3 (37.5)
Victoria	7 (20.6)	5 (19.2)	2 (25)
South Australia	2 (5.9)	1 (3.8)	1 (12.5)
Western Australia	0 (0)	0 (0)	0 (0)
Australian Capital Territory	3 (8.8)	2 (7.7)	1 (12.5)
Northern Territory	2 (5.9)	2 (7.7)	0 (0)
Tasmania	0 (0)	0 (0)	0 (0)
Geographical location			
Major city	13 (38.2)	9 (34.6)	4 (50)
Large regional area	5 (14.7)	3 (11.5)	2 (25)
Small regional area	12 (35.3)	11 (42.3)	1 (12.5)
Remote area	2 (5.9)	1 (3.8)	1 (12.5)
Very remote area	2 (5.9)	2 (7.7)	0 (0)
School type			
Public	27 (79.4)	19 (73.1)	8 (100)
Catholic	3 (8.8)	3 (11.5)	0 (0)
Independent	3 (8.8)	3 (11.5)	0 (0)
Other	1 (2.9)	1 (3.8)	0 (0)
CSPAP			
No	14 (41.2)	11 (42.3)	3 (37.5)
Yes	14 (41.2)	12 (46.2)	2 (25)
Unsure	6 (17.6)	3 (11.5)	3 (37.5)
School role			
Classroom teacher	26 (76.5)		
Assistant principal	4 (11.8)		
Deputy principal	2 (5.9)		
School principal	2 (5.9)		
Year Level*			
Prep/Kindergarten	16		
Year 1	23		
Year 2	17		

CSPAP comprehensive school physical activity program, School principals refers to assistant, deputy and school principals; SD standard deviation

\*Participants could choose multiple response options and therefore frequencies do not add up to n = 34

of CBPA programs to students in Prep/kindergarten to Year 2 are outlined in Table 3.

The majority of participants perceived factors categorised at the individual and public policy levels of the social ecological framework as facilitators to providing CBPA (Table 3). However, in contrast to five of their peers and two-thirds of the classroom teachers who perceived their competence to plan and deliver CBPA as a facilitator, three principals perceived their competence in this area as a barrier.

At the interpersonal level of the social ecological framework, the strongest facilitator of CBPA reported by

participants was observing an improvement in student engagement during or following CBPA. The ability for staff to share ideas and resources for CBPA and the ability for students with additional support/learning needs to participate in CBPA were also largely perceived as facilitators. Just over half the total participants listed attitudes and beliefs from their peers towards CBPA (n = 17) and the ability to participate in peer observation (n = 18) as facilitators. However, three principals listed these latter factors as barriers. Almost half of participants (n = 16) listed observing disruptive student behaviour as neither a barrier nor a facilitator,

**Table 3** Factors (barriers/facilitators) that may influence the provision of classroom-based physical activity programs to students in Prep/kindergarten to Year 2

Factors (categorised within levels of the social ecological framework)	Perceived as a barrier Frequency (%)			Perceived as a facilitator Frequency (%)			Perceived as neither barrier nor facilitator Frequency (%)		
	Total sample	CT	SP	Total sample	CT	SP	Total sample	CT	SP
<b>Individual (intrapersonal) level</b>									
<i>Personal/professional</i>									
Your perception of the need to provide CBPA at your school (n = 34)	3 (8.8)	2 (7.7)	1 (12.5)	<b>26 (76.5)</b>	<b>21 (80.8)</b>	5 (62.5)	5 (14.7)	3 (11.5)	2 (25)
Your perception of the benefits of providing CBPA at your school (n = 32)	2 (6.3)	1 (4.2)	1 (12.5)	<b>28 (87.5)</b>	<b>21 (87.5)</b>	<b>7 (87.5)</b>	2 (6.3)	2 (8.3)	0 (0)
Your perceived competence (self-efficacy) to plan and deliver CBPA at your school (n = 33)	7 (21.2)	4 (16)	<b>3 (37.5)</b>	<b>22 (66.7)</b>	<b>17 (68)</b>	5 (62.5)	4 (12.1)	4 (16)	0 (0)
<b>Interpersonal level</b>									
<i>Student</i>									
Disruptive student behaviour during or following CBPA (n = 34)	11 (32.4)	8 (30.8)	3 (37.5)	7 (20.6)	5 (19.2)	2 (25)	<b>16 (47.1)</b>	<b>13 (50)</b>	<b>3 (37.5)</b>
Improvement in student engagement during or following CBPA (n = 33)	2 (6.1)	2 (8)	0 (0)	<b>29 (87.9)</b>	<b>21 (84)</b>	<b>8 (100)</b>	2 (6.1)	2 (8)	0 (0)
Ability for all students with additional support/learning needs to participate in CBPA (n = 32)	5 (15.6)	4 (16.7)	1 (12.5)	20 (62.5)	14 (58.3)	<b>6 (75)</b>	7 (21.9)	6 (25)	1 (12.5)
<i>Peer</i>									
Attitudes and beliefs from peers towards CBPA at your school (n = 34)	8 (23.5)	5 (19.2)	<b>3 (37.5)</b>	17 (50)	13 (50)	4 (50)	9 (26.5)	8 (30.8)	1 (12.5)
Ability for staff to participate in peer observation of CBPA (n = 32)	4 (12.5)	1 (4.2)	<b>3 (37.5)</b>	18 (56.3)	13 (54.2)	5 (62.5)	10 (31.3)	<b>10 (41.7)</b>	0 (0)
Ability for staff to share ideas and resources for CBPA with colleagues (n = 32)	4 (12.5)	2 (8.3)	2 (25)	21 (65.6)	<b>16 (66.7)</b>	5 (62.5)	7 (21.9)	6 (25)	1 (12.5)
<b>Organisational (institutional) level</b>									
<i>School administration</i>									
Having sufficient time to schedule CBPA into the regular routine (n = 33)	<b>18 (54.5)</b>	<b>11 (44)</b>	<b>7 (87.5)</b>	12 (36.4)	11 (44)	1 (12.5)	3 (9.1)	3 (12)	0 (0)
Having a supportive school climate (including support from administration) (n = 32)	7 (21.9)	6 (25)	1 (12.5)	21 (65.6)	15 (62.5)	<b>6 (75)</b>	4 (12.5)	3 (12.5)	1 (12.5)
Compatibility of CBPA with school values (n = 32)	5 (15.6)	5 (20.8)	0 (0)	<b>22 (68.8)</b>	<b>16 (66.7)</b>	<b>6 (75)</b>	5 (15.6)	3 (12.5)	2 (25)
<i>School environment</i>									
The amount of space available inside the classroom (n = 33)	<b>15 (45.5)</b>	<b>11 (44)</b>	<b>4 (50)</b>	13 (39.4)	10 (40)	3 (37.5)	5 (15.2)	4 (16)	1 (12.5)
The amount of space available outside in the playground (n = 32)	7 (21.9)	7 (29.2)	0 (0)	<b>22 (68.8)</b>	<b>16 (66.7)</b>	<b>6 (75)</b>	3 (9.4)	1 (4.2)	2 (25)
<i>Training / support</i>									
The provision of PD/training to staff to ensure they have the necessary knowledge & skills to provide PA opportunities in the classroom (n = 33)	10 (30.3)	6 (24)	<b>4 (50)</b>	20 (60.6)	16 (64)	4 (50)	3 (9.1)	3 (12)	0 (0)



**Table 3** (continued)

Factors (categorised within levels of the social ecological framework)	Perceived as a barrier Frequency (%)			Perceived as a facilitator Frequency (%)			Perceived as neither barrier nor facilitator Frequency (%)		
	Total sample	CT	SP	Total sample	CT	SP	Total sample	CT	SP
Availability of quality resources, including examples of developmentally appropriate methods of CBPA (n = 32)	9 (28.1)	7 (29.2)	2 (25)	18 (56.3)	14 (58.3)	4 (50)	5 (15.6)	3 (12.5)	2 (25)
Public policy level									
<i>Policy</i>									
Reading an evidence-based research article from an esteemed educational journal that describes how PA may enhance children's learning (n = 33)	1 (3)	1 (4)	0 (0)	<b>25 (75.8)</b>	<b>19 (76)</b>	<b>6 (75)</b>	7 (21.2)	5 (20)	2 (25)
Awareness and knowledge of Australia's Physical Activity and Sedentary Behaviour Guidelines that recommend children aged 5–12 years should accumulate at least 60 min of MVPA every day (n = 32)	2 (6.3)	2 (8.3)	0 (0)	<b>24 (75)</b>	<b>18 (75)</b>	<b>6 (75)</b>	6 (18.8)	4 (16.7)	2 (25)
Awareness and knowledge of Australia's National Physical Activity Policy recommending that primary schools provide students with 120 to 150 min of PE and organised physical activity each week (n = 29)	4 (13.8)	3 (13.6)	1 (14.3)	19 (65.5)	<b>16 (72.7)</b>	3 (42.9)	6 (20.7)	3 (13.6)	<b>3 (42.9)</b>

CBPA: classroom-based PA; CT: classroom teacher (n = 26); MVPA: moderate to vigorous physical activity; PD: professional development; PE: physical education; SP: assistant, deputy or school principal (n = 8);

Barrier (bold represents > 33% responses were perceived as a barrier), Facilitator (bold represents > 66.6% responses were perceived as a facilitator), Neither barrier nor facilitator (bold represents > 33.3% responses were perceived as neither barrier nor facilitator)

while a third of participants (n = 11) listed disruptive student behaviour as a barrier.

Organisational level factors including having a supportive school climate, compatibility of CBPA with school values and the amount of space available outside in the playground were predominantly perceived as facilitators. However, participant responses regarding other organisational level factors were mixed, including having sufficient time to schedule CBPA into the regular routine, the amount of space available inside the classroom, the provision of training, and availability of resources. For example, having sufficient time and space inside the classroom were identified as barriers (n = 18, n = 15, respectively) more frequently than as facilitators (n = 12, n = 13, respectively). However, the provision of training and availability of quality resources were identified more frequently as facilitators (n = 20, n = 18, respectively) than as barriers (n = 10, n = 9, respectively). Responses from principals and classroom teachers were on the whole very similar. However, from the perspective of principals, having sufficient time to schedule CBPA into the regular routine was the strongest barrier to providing CBPA, with the amount of

space available inside the classroom and provision of PD/training also perceived as barriers by half (n = 4) of school principals. The perceived benefits of CBPA and observed improvements in student engagement were the strongest facilitators reported by principals.

### Major Barriers for Providing Classroom-based Physical Activity and Proposed Solutions

A total of 28 of the 34 participants answered the open-ended survey question regarding major barriers to implementing CBPA and 24 of them offered potential solutions. A total of seven themes emerged for the major barriers identified by participants for providing CBPA to students in the early years of primary school (Table 4).

Five themes were categorised as organisation-level factors, including:

(i) insufficient time (n = 24 references):

*'Time would be seen as a barrier with pressures of curriculum unfortunately.'* (Participant 23);

**Table 4** Themes of major barriers for providing classroom-based PA and proposed solutions

Theme	Social ecological level	References (Total) (n = 28)	References (CT) (n = 20)	References (SP) (n = 8)
<b>Barriers (n = 28)</b>				
Insufficient time	Organisational	24	17	7
Staff attitudes, knowledge, beliefs	Individual	16	11	5
Lack of training, resources, equipment	Organisational	14	10	4
Lack of space inside classroom	Organisational	7	5	2
Student characteristics	Interpersonal	4	3	1
School ethos	Organisational	5	4	1
School policy	Organisational	2	2	0
No barriers		2	1	1
Weather		1	1	0
<b>Proposed solutions (n = 24)</b>				
Provision of training and resources	Individual, organisational	16	11	5
Scheduling CBPA into regular routine	Organisational	9	4	5
Administration support	Organisational	7	5	2
School PA policies	Organisational	5	5	0
Funding	Organisational	3	2	1
Engaging with parents/community	Community	3	1	2
Collaboration with peers	Interpersonal	3	2	1
Access to facilities	Organisational	2	2	0
No solution suggested		1	1	0

CT classroom teacher, SP assistant, deputy or school principal

(ii) lack of training, resources and equipment (n = 14 references):

*'Not having adequate resources easily accessible or organised'* (Participant 2);

(iii) lack of space inside the classroom (n = 7 references);

(iv) school ethos (n = 5 references):

*'NAPLAN focus; Academic results focus; school ethos for academic excellence only'* (Participant 25); and

(v) school policies (n = 2 references).

One theme was categorised as an individual-level factor, and related to staff attitudes, knowledge, beliefs and confidence (n = 16 references):

*'Knowledge and awareness of the evidence of the benefits of physical activity for children'* (Participant 2).

One final theme was categorised as an interpersonal-level factor and related to student characteristics, including disruptive behaviour (n = 4 references). Themes relating to major barriers were consistent between classroom teachers and principals.

A total of eight themes emerged for solutions proposed by participants for overcoming the major barriers identified for providing CBPA to students in the early years of school. Six themes were categorised as organisation-level solutions, including:

(i) the provision of training, resources and equipment relating to CBPA (n = 16 references):

*'Providing readings and data related to the benefits of physical activity and the links with student engagement. If executive staff can see the link with engagement they are more likely to consider this encouragement and support'* (Participant 27);

(ii) scheduling CBPA into the regular routine (n = 9 references):

*'Make it a routine; Live life well @ school initiatives; make a school culture of health, nutrition, and physical activity'* (Participant 11);

(iii) administration support (n = 7 references):

*'Administrators to model 'in class' physical activity when conducting staffroom in services; Talk the talk encourage and support any increased activity for staff and students. Promote whole school fitness'* (Participant 3);

(iv) school PA policies (n = 5 references):

*'National curriculum requirement that has all children engage in classroom physical movement/kinaesthetic'*

*activities for 60 minutes every day built into the daily timetable*' (Participant 25);

(v) funding (n=3 references); and.

(vi) access to facilities (n=2 references).

One participant shed light on the impact that school policy and education/training may have on minimising perceived barriers:

*'We are required to provide children with physical activity on a daily basis, so there are no barriers as it is a requirement'. 'We aim to engage in a movement break every 20 minutes. This approach was recommended to me by a physiotherapist I worked with and is also supported by the occupational therapists. This is supported by evidence based research. When children are provided with regular opportunities to move, it increases their focus and concentration, therefore having a positive impact on their learning'* (Participant 13).

Another solutions theme, collaboration with peers, related to interpersonal-level factors:

*'Mentoring from confident skilled staff. Sharing best practice. Cooperative planning'* (Participant 10).

One final theme related to community level factors was the suggestion to engage with parents/communities by increasing their awareness of the benefits of school PA programs (n=3 references):

*'getting the community on board'* (Participant 27).

## Discussion

The aim of this study was to examine factors that influence the provision of CBPA to students in the early years of primary school in Australia, within a social ecological framework. Based on self-report data from the participant sample, there was evidence to suggest that, at the time of this study, classroom teachers in Australia were providing some PA opportunities to students in Prep/kindergarten to Year 2 during school class time, including both physically active lessons and PA breaks. However, variability in the frequency, duration, and type of PA included in active lessons and breaks was evident.

Overall, the factors that participants reported as influencing the provision of CBPA to students in the early years of primary school related primarily to the organisational level (i.e., occur at school level) and individual level (i.e., exist within the participant themselves) of influence within a social ecological framework. However, several other factors, relating to the interpersonal, community, and public policy levels of influence, were also highlighted. These findings

are important as they suggest that multiple strategies, particularly targeted at the individual and organisational levels, may need to be employed to support Australian schools in overcoming the perceived barriers that currently exist to providing PA opportunities to students in the early years of school during class time.

Findings from the present study revealed that Australian classroom teachers and assistant, deputy, and school principals perceive organisational (or school) level factors, including insufficient time and a lack of training, resources and space to be the major barriers to providing CBPA to students in the early years of school. These findings are in agreement with institutional barriers to movement integration in elementary classrooms identified in the systematic review by Michael et al (2019), which also included time, availability of resources, space and administrative support (Michael et al. 2019). However, findings reported in that review were from studies conducted predominantly in the United States. Several studies conducted in Australia (Usher and Anderton 2014; Macdonald et al. 2014; Mazzoli et al. 2019; Watson et al. 2019) have also reported insufficient time as a major barrier to implementing CBPA and this related to difficulties scheduling PA opportunities into the regular school class routine due to an already crowded curriculum. However, this is the first study to seek feedback from school staff regarding the factors influencing the provision of CBPA to children specifically in the early years of school in Australia. In contrast, knowledge of the factors (barriers/facilitators) influencing the provision of CBPA to children in the early years of school identified in the present study can guide the design of future CBPA interventions with these year groups.

The most commonly reported solutions for overcoming barriers at the organisation level reported by participants in the present study included the provision of training, resources and equipment, scheduling CBPA into the regular school routine, and having support from school administrators. This suggests that creating a school culture where PA promotion is valued and supported may be essential. Furthermore, school principals who perceive PA as being important for students' health and learning, may be in a position to influence the extent to which government PA policies are implemented and monitored in their individual schools (Langille and Rodgers 2010).

Individual level factors, including staff attitudes, knowledge, beliefs, and confidence, were also perceived by participants in the current study to be influential barriers to providing CBPA. The solution proposed by participants of providing training and resources to school staff may overcome these barriers. Given that participants reported the perceived need for and benefits of providing CBPA were strong facilitators of implementation of CBPA (in quantitative responses), this suggests that if school staff (teachers and principals) do not understand the value and benefits

of CBPA, they may be less likely to advocate for these opportunities to be provided. Therefore, providing school staff with evidence-based articles or training regarding the relationships between children's PA, health, and learning may improve their knowledge of the rationale and benefits of CBPA. This may be particularly important for school principals, given that in the current study it was this group that most strongly perceived the benefits of CBPA to be a facilitator of CBPA. In addition, the provision of training to school staff, that includes practical information on how to schedule CBPA into the regular routine, along with examples and resources on CBPA, may help to increase staff confidence. This may be a priority area in which to focus support, given that teacher confidence has been identified in several other studies as being an influential facilitator in determining whether movement opportunities will be provided to children throughout the school day (Michael et al. 2019; Usher and Anderton 2014).

At the interpersonal level (i.e., student and peer factors), only one third of participants perceived observing disruptive student behaviour as a barrier to providing CBPA, whereas almost half the participants reported perceiving it as neither a facilitator nor barrier. This finding is in contrast to other studies conducted in Australia where behavioural challenges with students in Prep/kindergarten to Year 6 have been reported as a barrier for implementing short PA breaks into the school day (Mazzoli et al. 2019; Watson et al. 2019). Notably, one of the strongest facilitators for providing CBPA (in quantitative responses) identified by participants in this study was observing an improvement in student engagement during or following CBPA. This suggests that educating school principals and classroom teachers on the ability for CBPA to result in improved education behaviours, such as student engagement, may be another key element of training (Michael et al. 2019). Solutions aimed at improving staff collaboration, including sharing ideas and resources relating to CBPA with peers, may also be useful.

Several participants made reference to the importance of engaging with the wider school community, which has been highlighted as a key component of a CSPAP (Centers for Disease Control and Prevention 2013). Participants suggested that having assistance from external organisations to run school-based PA programs, along with increasing parents' awareness of the benefits of school PA programs would be beneficial in supporting schools to run such programs. The importance of educating families on the benefits of PA has previously been reported in the literature (Hills et al. 2015).

The influence that public policy may have on the provision of CBPA was also highlighted in this study. Participants reported that evidence-based readings and having knowledge and awareness of PA and sedentary behaviour guidelines,

as well as national school PA and PE policies would be facilitators to providing CBPA. The implementation of whole-of-school PA policies was also proposed by several participants. This suggests that teachers may be receptive to receiving more direction from school principals around the implementation and monitoring of school and national PA policies—an observation that has been reported in other studies examining this topic (Langille and Rodgers 2010; Hills et al. 2015).

## Limitations

It is important to acknowledge a number of limitations to the present study. Firstly, a major limitation is that only a small number of participant responses were available for analysis. Therefore, given this small sample size, the study results are unable to be generalised to all school jurisdictions in Australia but may nevertheless usefully inform future research on this topic. It is worth noting the social ecological factors (facilitators/barriers) identified in the present study are consistent with those reported in studies conducted internationally (Michael et al. 2019) and in Australia (Usher and Anderton 2014). Secondly, the majority of participants who self-reported they were classroom teachers were currently delivering CBPA to students in Prep/kindergarten to Year 2. Therefore, the perceived barriers and facilitators for providing CBPA from classroom teachers who do not currently provide CBPA in Australia remain largely unknown. However, study findings do provide insight from classroom teachers who have already tried and tested CBPA, and are thus able to provide realistic suggestions for overcoming barriers they may have encountered. Thirdly, the wording in Sect. 3 of the questionnaire may have been ambiguous to participants, and this may explain the mixed results, particularly in relation to training/support factors. However, it was possible to triangulate the responses provided in Sect. 3 with open-ended responses to gain a deeper understanding of the factors (facilitators and barriers) influencing the provision of CBPA to students in the early years of school. In fact, during the qualitative content analysis process, there was evidence of having achieved data saturation in open-ended responses in that no new knowledge and/or themes emerged as the number of responses analysed increased (Creswell and Clark 2011). Although participants were provided with the definitions of CBPA in the questionnaire, including that it is distinct from scheduled PE lessons, several participants ticked that they integrated movement into the key learning area health and physical education (HPE). Given that in Australia, HPE is considered a key learning area and comprises both theoretical and practical components, we are unable to be certain that participants meant that they incorporated movement into the theoretical content of the HPE subject,

though the definitions provided to them at the start of the questionnaire make it most likely they were discussing CBPA and not scheduled PE classes. One final limitation of this study was that although staff attitudes, knowledge and beliefs were identified as an important barrier in open-ended responses (Table 4), these attitudes and beliefs were not explored in any depth. Therefore, further exploration of teacher beliefs regarding whether they believe increasing movement and/or reducing sedentary time during the school day may be beneficial to student learning outcomes and learning behaviours would be a valuable addition to future studies in this area.

## Conclusion

The widespread implementation of whole-of-school approaches to PA promotion in Australian schools is a key recommendation made recently to address current trends of physical inactivity in Australian children and young people (Active Healthy Kids Australia 2018; Schranz et al. 2018). Providing students in the early years of primary school with opportunities to be active throughout the school day through the provision of CBPA programs may be one way to optimise both PA-related and education outcomes. However, the findings of the present study suggest that multiple barriers exist for providing CBPA to students in the early years of school in Australia. Key barriers that were identified included insufficient time, limited training opportunities and resources and individual school staff characteristics, including attitudes towards PA and confidence to implement the activities. To enhance the ability for primary school staff to provide CBPA to students in the early years of school in Australia, strategies need to be implemented primarily at the individual (i.e., teacher/principal) and organisation (i.e., school) levels, whilst also considering the influence that government policies and families may have on this practice. Creating a school culture where school administrators value PA and implement whole-of-school PA policies that support scheduling PA opportunities into the regular routine may help to overcome identified barriers. The provision of training and resources should also be prioritised to improve staff knowledge regarding the benefits of CBPA on children's PA, health, and learning as well as to improve staff confidence in delivering such PA. Findings from this research will contribute to guiding how to best support Australian schools to implement CBPA programs and may interest school staff and policy makers committed to implementing a whole-of-school approach to PA promotion.

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**Data Availability** Pending institutional and ethic board approval, data may be available from the corresponding author on reasonable request.

## Compliance with Ethical Standards

**Conflict of interests** The authors declare they have no competing interests.

**Ethical Approval** The research protocol was approved by Bond University Human Research Ethics Committee (KM03093). Research approval was also granted by the State Education Research Approval Process (Reference number: 2019177), the Queensland Department of Education (Reference number: 550/27/2157) and the ACT Education Directorate (Reference number: RES-1910).

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